CLAIMS

Therefore, at least the following is claimed:

1.   1.   An apparatus for equalizing a discrete multi-tone (DMT) transmit spectrum,

2   comprising:

3   a DMT transmitter configured to generate a plurality of DMT carrier tones and

4   combine the plurality of carrier tones into a transmit symbol;

5   an amplifier configured to detect the transmit symbol;

6   a discrete Fourier transform (DFT) element configured to separate the transmit

7   symbol into the plurality of carrier tones; and

8   a gain adjustment element configured to adjust each of the plurality of carrier tones

9   based on a predefined transmit signal spectrum.

1   2.   The apparatus of claim 1, wherein each DMT carrier tone is independently

2   adjusted.

1   3.   The apparatus of claim 1, wherein the gain adjustment element further

2   comprises:

3   logic configured to measure the power on each of the plurality of carrier tones; and

4   logic configured to provide a gain scalar for each of the plurality of carrier tones.

1   4.   The apparatus of claim 1, wherein the amplifier monitors local line conditions.

1   5.   The apparatus of claim 1, wherein the transmit symbol is generated prior to a

2   start-up sequence.

1   6.   The apparatus of claim 1, wherein the transmit symbol is generated after a

2   start-up sequence.

1   7.   The apparatus of claim 1, wherein each of the plurality of DMT carrier tones

2   is encoded into a circular signal space constellation.

1   8.   The apparatus of claim 1, wherein each of the plurality of DMT carrier tones

2   is encoded into a square signal space constellation.

1   9.   A method for equalizing a discrete multi-tone (DMT) transmit spectrum, the

2   method comprising the steps of:

3   generating a plurality of DMT carrier tones;

4   combining the plurality of carrier tones into a transmit symbol;

5   detecting the transmit symbol;

6   separating the transmit symbol into the plurality of carrier tones; and

7   adjusting each of the plurality of carrier tones based on a predefined transmit signal

8   spectrum.

1 10. The method of claim 9, wherein the adjusting step further comprises the steps

2 of:

3 calculating a power level for each of the tones;

4 comparing the power level of each tone with a predetermined power level; and

5 adjusting the power level of each tone to match the predetermined power level.

1 11. The method of claim 9, wherein the adjusting step is performed using gain

2 scalars.

1 12. The method of claim 9, further comprising the step of monitoring a

2 communication line to detect impedance variations, where the adjusting step is responsive to

3 the impedance variations.

1 13. The method of claim 9, further comprising the step of generating the transmit

2 symbol prior to a start-up sequence.

1 14. The method of claim 10, further comprising the step of generating the transmit

2 symbol after a start-up sequence.

1 15. The method of claim 9, further comprising the step of encoding each of the

2 plurality of DMT carrier tones into a circular signal space constellation.

1   16.   The method of claim 9, further comprising the step of encoding each of the

2   plurality of DMT carrier tones into a square signal space constellation.

1   17.   An apparatus for equalizing a discrete multi-tone (DMT) transmit spectrum,

2   comprising:

3   means for generating a plurality of DMT carrier tones;

4   means for combining the plurality of carrier tones into a transmit symbol;

5   means for detecting the transmit symbol;

6   means for separating the transmit symbol into the plurality of carrier tones; and

7   means for adjusting each of the plurality of carrier tones based on a predefined

8   transmit signal spectrum.

1   18.   The apparatus of claim 17, further comprising:

2   means for calculating a power level for each of the tones;

3   means for comparing the power level of each tone with a predetermined power level;

4   and

5   means for adjusting the power level of each tone to match the predetermined power

6   level.

1   19.   The apparatus of claim 17, wherein the adjusting means uses gain scalars.

1   20.   The apparatus of claim 17, further comprising means for monitoring a

2   communication line to detect impedance variations and where the adjusting means is

3   responsive to the impedance variations.

1   21.   The apparatus of claim 17, further comprising means for generating the

2   transmit symbol prior to a start-up sequence.

1   22.   The apparatus as defined in claim 17, further comprising means for generating

2   the transmit symbol after a start-up sequence.

1   23.   The apparatus of claim 17, further comprising means for encoding each of the

2   plurality of DMT carrier tones into a circular signal space constellation.

1   24.   The apparatus of claim 17, further comprising means for encoding each of the

2   plurality of DMT carrier tones into a square signal space constellation.

1   25.   An apparatus for equalizing a transmit spectrum of a digital subscriber line

2   (DSL) communication device, comprising:

3   means for generating a transmit symbol;

4   means for detecting the transmit symbol;

5   means for separating the transmit symbol into a plurality of frequencies; and

6   means for adjusting a power level associated with each of the plurality of frequencies

7   based on a predefined transmit signal spectrum.

1   26.   The apparatus of claim 25, wherein the communication device is quadrature

2   amplitude modulation (QAM) modulated single carrier.

1   27.   The apparatus of claim 25, wherein the communication device is carrierless

2   amplitude/phase (CAP) modulated single carrier.

1   28.   The apparatus of claim 25, wherein the means for adjusting a power level

2   associated with each of the plurality of frequencies based on a predefined transmit signal

3   spectrum further comprises a finite impulse response filter.